

# AN3224K

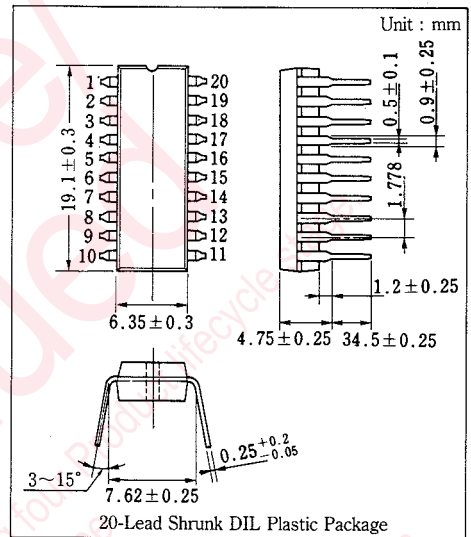
## Recording Amplifier Circuit for Video Signal (2-Head Type)

### ■ Outline

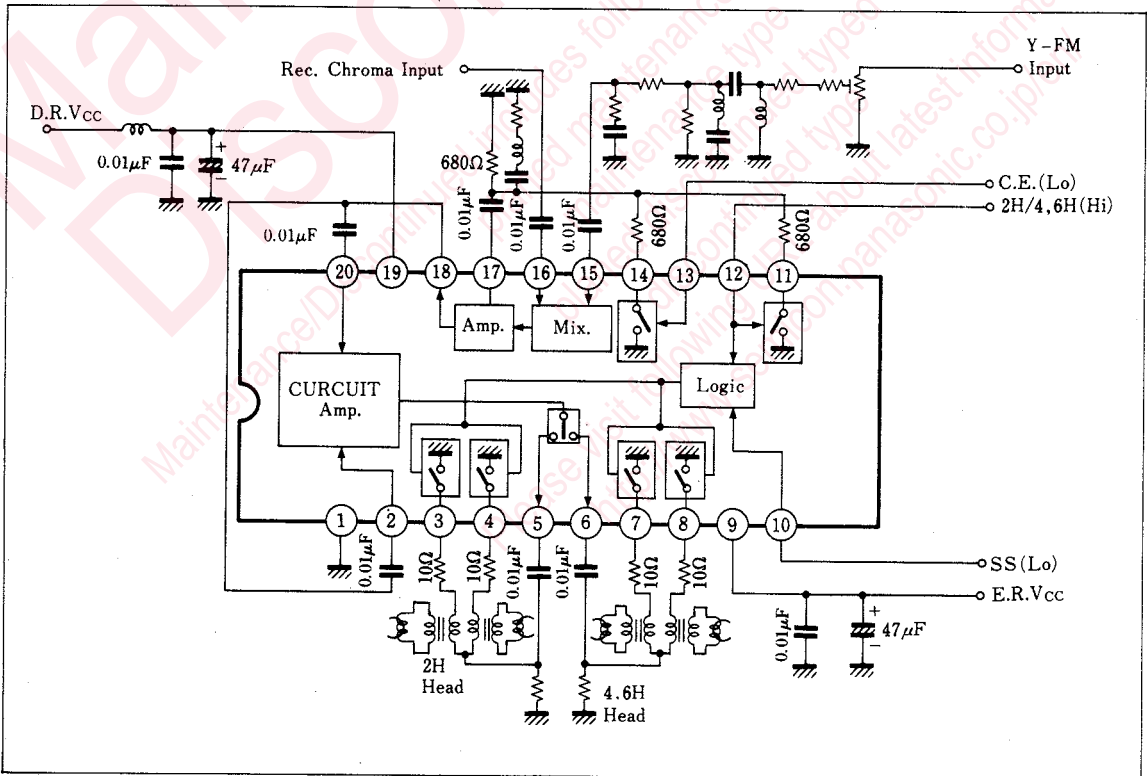
The AN3224K is an integrated circuit designed for recording amplifier circuit for video signal (4-head type).

### ■ Features

- Constant current output amplifier
- Built-in current emphasis function
- Built-in switching transistor
- Supply voltage :  $V_{cc}=12V$



### ■ Block Diagram



### ■ Pin

Pin No.	Pin Name	Pin No.	Pin Name
1	GND	11	2 H(SP)/4, 6 H(LP)Switch
2	Current Amp. Input(NPN)	12	2 H(SP)/4, 6 H(LP)Changeover
3	Switching Tr. (1)	13	Current Emphasis Changeover
4	Switching Tr. (2)	14	Current Emphasis switch
5	Recording Current Output(SP)	15	Recording FM Signal Input
6	Recording Current Output(LP)	16	Recording Chroma Signal Input
7	Switching Tr. (3)	17	Gain Changeover Amp. Control
8	Switching Tr. (4)	18	Gain Changeover Amp. Output
9	Except Rec. $V_{CC}$	19	Delayed Rec. $V_{CC}$
10	SS Changeover	20	Current Amp. Input(PNP)

### ■ Absolute Maximum Ratings ( $T_a=25^\circ\text{C}$ )

Item	Symbol	Rating	Unit
Supply Voltage	$V_{CC}$	14.4	V
Power Dissipation	$P_D$	700	mW
Operating Ambient Temperature	$T_{opr}$	-20~+70	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55~+150	$^\circ\text{C}$

### ■ Electrical Characteristics ( $T_a=25^\circ\text{C}$ )

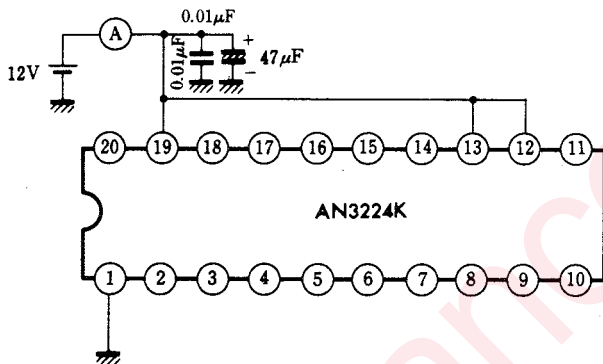
Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Circuit Current(REC)	$I_{19}$	1	Delayed Rec. $V_{CC}$ (D.R. $V_{CC}$ )=12V	31		50.5	mA
Circuit Current(PB)	$I_9^{*1}$	2	Except Rec. $V_{CC}$ =5V	9.3		17.5	mA
Recording Current Output(LP)	$I_6$	3	D.R. $V_{CC}$ =12V, $f_{IN}$ =4MHz	7.5		13.1	$\text{mA}_{P-P}/\text{ch}$ .
Recording Current Output(SP)	$I_5$	3	D.R. $V_{CC}$ =12V, $f_{IN}$ =4MHz	15.8		24.2	$\text{mA}_{P-P}/\text{ch}$ .
Chroma Recording Current Output	$I_{5-C}$	3	D.R. $V_{CC}$ =12V, $f_{IN}$ =4MHz	6.2		14	$\text{mA}_{P-P}/\text{ch}$ .
2H(SP)/4,6H(LP)Changeover Voltage	$V_{13}$	4	D.R. $V_{CC}$ =12V			2	V
Current Emphasis Changeover Voltage	$V_{12}$	4	D.R. $V_{CC}$ =12V			2	V
SS Changeover Voltage	$V_{10}$	5	E.R. $V_{CC}$ =5V			3	V
Switching Tr. ON Voltage(1)	$v_3^{*2}$	6	D.R. $V_{CC}$ =12V, $f_{IN}$ =4MHz	25		150	$\text{mV}_{P-P}$
Switching Tr. ON Voltage(2)	$v_4^{*2}$	6	D.R. $V_{CC}$ =12V, $f_{IN}$ =4MHz	25		150	$\text{mV}_{P-P}$
Switching Tr. ON Voltage(3)	$v_7^{*2}$	6	D.R. $V_{CC}$ =12V, $f_{IN}$ =4MHz	10		135	$\text{mV}_{P-P}$
Switching Tr. ON Voltage(4)	$v_8^{*2}$	6	D.R. $V_{CC}$ =12V, $f_{IN}$ =4MHz	10		135	$\text{mV}_{P-P}$
Recording Current Secondary Distortion(LP)	$D_6^{*2}$	7	D.R. $V_{CC}$ =12V			-28	dB
Recording Current Secondary Distortion(SP)	$D_5^{*2}$	7	D.R. $V_{CC}$ =12V			-28	dB
Cross-modulation Relative Level(LP)	$D_{6\pm f}^{*2}$	7	D.R. $V_{CC}$ =12V			-35	dB
Cross-modulation Relative Level(SP)	$D_{5\pm f}^{*2}$	7	D.R. $V_{CC}$ =12V			-35	dB
Recording Current Rated Current Characteristics	$I_5'/I_t^{*2}$	7	D.R. $V_{CC}$ =12V	-0.8		0.8	dB

Note : Operating Supply Voltage Range :  $V_{CC(opp)}=11.0\sim 12.5\text{V}$

\*1. Pin⑨ is EXCEPT REC.  $V_{CC}$  terminal and 5V is used. When the voltage is simultaneously applied to Pins⑨ and ⑩, ICs may be destroyed.

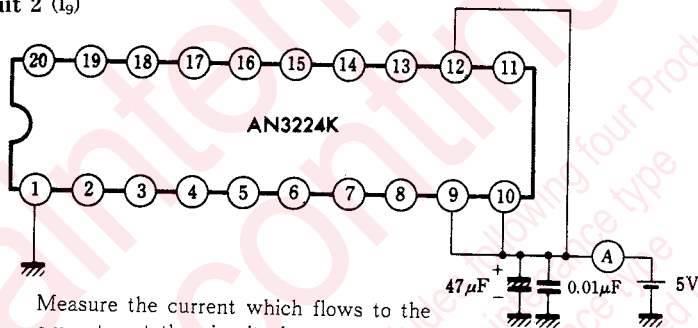
\*2. It is a reference value for design but not a guaranteed value.

Test Circuit 1 ( $I_{19}$ )



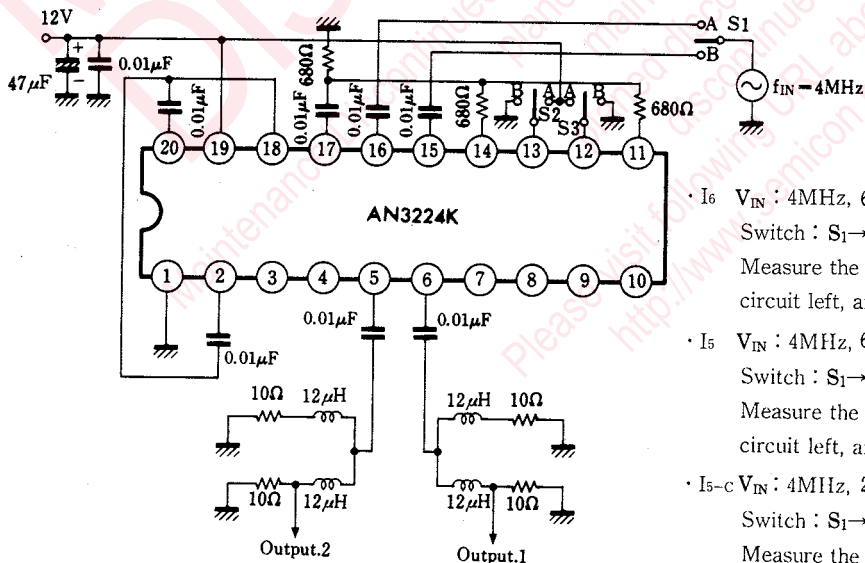
Measure the current which flows to the ammeter at the circuit above.

Test Circuit 2 ( $I_9$ )



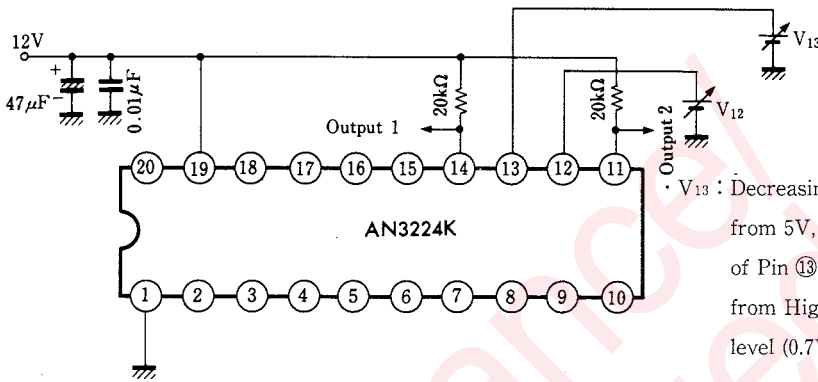
Measure the current which flows to the ammeter at the circuit above.

Test Circuit 3 ( $I_6$ ,  $I_5$ ,  $I_{5-c}$ )



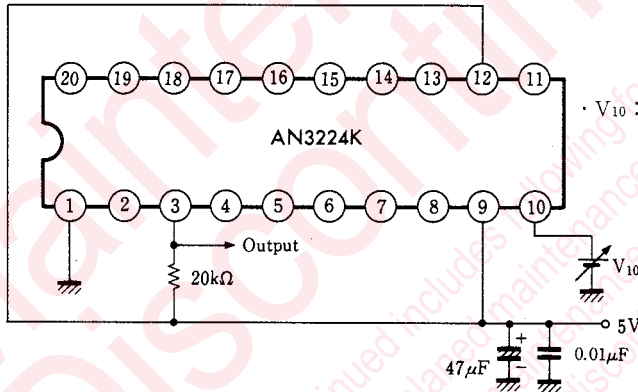
- $I_6$   $V_{IN} : 4\text{MHz}, 60\text{mV}_{P-P}$   $V_{CC} : 12\text{V}$   
Switch :  $S_1 \rightarrow B, S_2 \rightarrow A, S_3 \rightarrow A$   
Measure the voltage of output 1 at the circuit left, and divide it by  $10 \Omega$ .
- $I_5$   $V_{IN} : 4\text{MHz}, 60\text{mV}_{P-P}$   $V_{CC} : 12\text{V}$   
Switch :  $S_1 \rightarrow B, S_2 \rightarrow A, S_3 \rightarrow B$   
Measure the voltage of output 2 at the circuit left, and divide it by  $10 \Omega$ .
- $I_{5-c}$   $V_{IN} : 4\text{MHz}, 240\text{mV}_{P-P}$   $V_{CC} : 12\text{V}$   
Switch :  $S_1 \rightarrow A, S_2 \rightarrow A, S_3 \rightarrow B$   
Measure the voltage of output 2 at the circuit left, and divide it by  $10 \Omega$ .

Test Circuit 4 ( $V_{13}$ ,  $V_{12}$ )



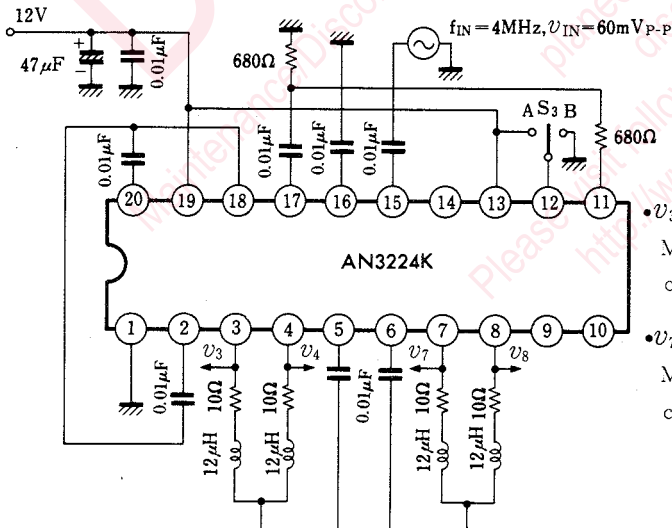
- $V_{13}$ : Decreasing the electric potential of Pin ⑬ from 5V, measure the electric potential of Pin ⑬ when Pin ⑭ output is switched from High level (11V or more) to Low level (0.7V or less).
- $V_{12}$ : Decreasing the electric potential of Pin ⑫ from 5V, measure the electric potential of Pin ⑫ when Pin ⑪ output is switched from High level (11V or more) to Low level (0.7V or less).

Test Circuit 5 ( $V_{10}$ )



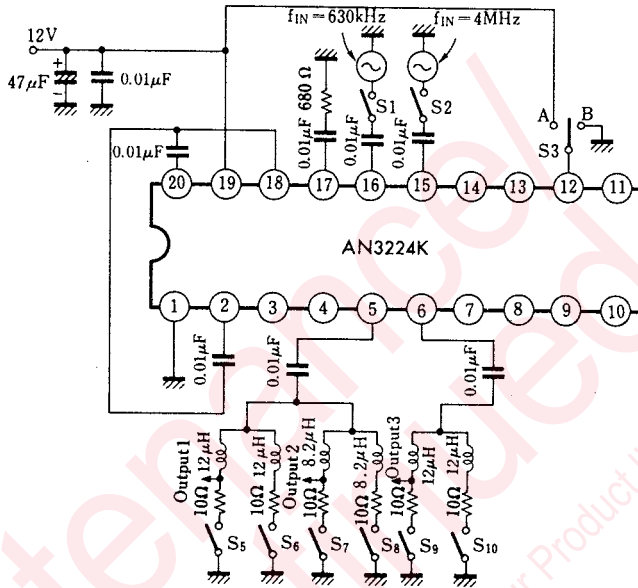
- $V_{10}$ : Increasing the electric potential of Pin ⑩ from 0V, measure the electric potential of Pin ⑩ when Pin ③ output is switched from High level (4.2V or more) to Low level (0.6V or less).

Test Circuit 6 ( $v_3$ ,  $v_4$ ,  $v_7$ ,  $v_8$ )



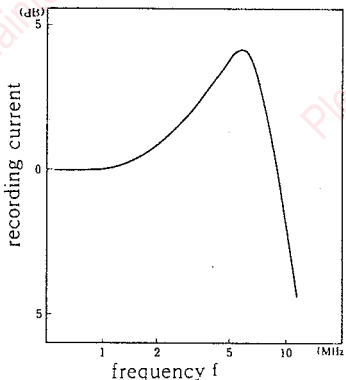
- $v_3$ ,  $v_4$ : (Switch condition :  $S_3 \rightarrow B$ )  
Measure signal voltages of  $v_3$  and  $v_4$  at the circuit shown left.
- $v_7$ ,  $v_8$ : (Switch condition :  $S_3 \rightarrow B$ )  
Measure signal voltages of  $v_7$  and  $v_8$  at the circuit shown left.

Test Circuit 7 ( $D_6$ ,  $D_5$ ,  $D_{6\pm f}$ ,  $D_{5\pm f}$ ,  $I_5/I_5'$ )



- $D_6$  : (Switch condition :  $S_3 \rightarrow A$ ,  $S_2, S_9, S_{10} \rightarrow$ Short - circuit, Other switches  $\rightarrow$ Open)  
After monitoring a waveform at Output 3, set the recording current to be  $12\text{mA}_{P-P}/\text{Ch}$ . and then measure that secondary distortion with a spectrum analyzer.
- $D_5$  : (Switch condition :  $S_3 \rightarrow B$ ,  $S_2, S_5, S_8 \rightarrow$ Short - circuit, Other switches  $\rightarrow$ Open)  
After monitoring a waveform at Output 1, set the recording current to be  $12\text{mA}_{P-P}/\text{Ch}$ . and then measure that secondary distortion with a spectrum analyzer.
- $D_{6\pm f}$  : (Switch condition :  $S_3 \rightarrow A$ ,  $S_9, S_{10} \rightarrow$ Short - circuit, Other switches  $\rightarrow$ Open)  
After monitoring a waveform at Output 3, first short - circuit the switch  $S_2$  to set the recording current to be  $12\text{mA}_{P-P}/\text{Ch}$ . Next, open the switch  $S_2$ , while short the switch  $S_1$ , to set the recording current to be  $4\text{mA}_{P-P}/\text{Ch}$ . Under this condition, short - circuit the switch  $S_2$  to measure the cross - modulation at Output 1 with a spectrum analyzer.
- $D_{5\pm f}$  : (Switch condition :  $S_3 \rightarrow B$ ,  $S_5, S_8 \rightarrow$ Short - circuit, Other switches  $\rightarrow$ Open)  
After monitoring a waveform at Output 1, first short - circuit the switch  $S_2$  to set the recording current to be  $12\text{mA}_{P-P}/\text{Ch}$ . Next, open the switch  $S_2$ , while short the switch  $S_1$ , to set the recording current to be  $4\text{mA}_{P-P}/\text{Ch}$ . Under this condition, short - circuit the switch  $S_2$  to measure the cross - modulation at Output 1 with a spectrum analyzer.
- $I_5'/I_5$  : (Switch condition :  $S_3 \rightarrow B$ ,  $S_2 \rightarrow$ Short - circuit, Other switches  $\rightarrow$ Open)  
After monitoring a waveform at Output 1, first short - circuit the switches  $S_5$  and  $S_9$  to set the recording current to be  $12\text{mA}_{P-P}/\text{Ch}$ . Next, open the switch, while short the switches  $S_7$ , and  $S_8$ , to measure the recording current  $I_5'$  at Output 2.

(Reference)



An example of the frequency characteristics of recording current at Test Circuit 7

This characteristics varies depending on ICs.

Therefore, use ICs under the sufficient damping condition of a resonance peak.

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